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ment before the close of 1903. The district is part of the Ozark Plateau region, and is drained by the White River and its branches.

No. 25. *The Copper Deposit of the Encampment District, Wyoming, by A. C. Spencer.* The district is on the southern border of Wyoming, and is traversed by the Continental Divide. Producing mines are few, and the region is chiefly of interest for the possible results of explorations now in progress.

No. 26. *Economic Resources of the Northern Black Hills, by J. D. Irving and others. 222 pp.* The report is mainly devoted to mining details in the region west of Deadwood.

No. 27. *A Geological Reconnaissance across the Bitter Root Range and Clearwater Mountains in Montana and Idaho, by W. Lindgren.* This report treats of a little-known region of rugged mountains extending from Northwestern Montana across Northern Idaho. Here was the crossing of the Lewis and Clark expedition in the Northern Rocky Mountains. A. P. B.

GEOGRAPHICAL RECORD.

AMERICA.

TRAVELS OF CHARLES ALEXANDRE LESUEUR IN THE UNITED STATES.—Quatrefages said of this naturalist that he was the first among painters of natural history. The *Journal* of the Society of Americanists, of Paris, devotes its March number to an account of the *Voyages de C. A. Lesueur en Amérique*, from the pen of Dr. E. T. Hamy, and dedicates it to the learned institutions and societies of this country as a souvenir of the part taken by French explorers in the scientific conquest of this country. Probably few of our countrymen now living ever heard of this Frenchman, gifted both as a scientific observer and as a painter, who devoted his talents to natural history investigations in our country from 1815 to 1837. The study of science in America was then young, and the long labours of Lesueur in the field were a helpful and stimulating influence.

He came to America under the patronage of William Maclure of Philadelphia, who made a fortune in business, and whose enthusiastic devotion to geology, almost before it was recognized as a science, led to his being called "the Father of American Geology." Dr. Hamy tells the story of the naturalist's long wanderings here, his favourite studies leading him across the Appalachians, through the Great Lakes, over New England back to the Mississippi, and down that river to New Orleans. Notebook and pencil were always in hand for recording his observations or making sketches, many of which were later turned into water-colours. He discovered several new genera and a considerable number of new species of fishes. Most of his scientific papers were published in the *Journal* of the Academy of Natural Sciences, Philadelphia. Dr. Hamy's monograph concludes with a bibliography of the works of Lesueur, and twelve views of the Mississippi River, drawn by him between 1828 and 1830. The handsome memoir also includes many other reproductions from Lesueur's sketches and water-colours. The Duke de Loubat defrayed the cost of publishing this tribute to the American labours of the French naturalist.

NEGROES IN THE UNITED STATES.—Bulletin 8 of the Census Bureau, a volume of 333 folio pages, contains the most detailed and exhaustive statistical analysis of the negro element in our population that has yet been made. Over two-thirds of the volume is filled with general tables deduced from the Twelfth Census. They are introduced by two summary chapters: The Negro Population (pp. 11–68), by Mr. Walter F. Wilcox; and The Negro Farmer (pp. 69–98), by Professor Du Bois. It is possible here to give only a brief summary of the leading facts presented.

The total number of our negro population, including Alaska, Hawaii and Porto Rico, is (Twelfth Census) 9,204,531, of whom 8,840,789 live in the continental United States, to which the facts in the volume are confined. Of those living in the continental United States, 89.7 per cent. are in the South Atlantic and South Central States, 31.4 per cent. living in Georgia, Mississippi, and Alabama. A map (p. 22) shows the black belt, or counties in which the total population is at least one-half negro. This belt extends through all the South Atlantic and Gulf States, from southeastern Virginia to southeastern Texas, and also occupies a wide north and south zone on both sides of the Mississippi from Tennessee to the Delta. In fifty-five counties of South Carolina, Georgia, Alabama, Mississippi, Florida, Louisiana, and Arkansas the negro population is 75 per cent. or more of the total population. The proportion of negroes is greatest in the Mississippi alluvial region, where five-eighths of the population is negro. The maximum is reached in Issaquena County, Miss., with more than fifteen negroes to each white person.

The centre of the negro population has moved since 1790 from near Petersburg, Va., 476 miles southwest to a point in Dekalb County, northeastern Alabama.

More than three-fourths of the negroes live in the country, but the negro population of cities is increasing more than two and one-half times as fast as that of the country districts. Comparing the censuses of 1890 and 1900, negroes in the 242 southern cities increased nearly one-third faster than negroes in the country districts; and in the country districts of the South negroes increased only two-thirds as fast as the whites. Negroes constitute 6.6 per cent. of the city population, and 15 per cent. of the country population of the continental United States. Unlike the Indians and the native whites, the negroes have a slight excess of females. Half of the negroes are below 19.4 years old, the median age being four years below that of the whites. This difference is closely connected with the high birth and death rates of the negroes. Illiteracy among negroes is about seven times as common as among whites, and among southern negroes it is more than four times that among southern whites. The percentage of illiterates is 44.5, and has greatly decreased since 1890, when it was 57.1 per cent.

There are 3,992,337 negroes engaged in gainful pursuits. In agriculture old men and women help in bread-winning much more generally than is the case among the whites. The occupations of the larger number of negroes are those of agricultural labourers (1,344,125), farmers, planters and overseers (757,822), other labourers (545,935), servants and waiters (465,734), and launderers and laundresses (220,104). The number of farms operated by negroes is 746,717, containing 38,233,933 acres, or 59,741 square miles. Of these farms 21 per cent. are owned entirely, and an additional 4.2 per cent. owned in part by the farmers operating them.

PRODUCTION OF COAL IN THE UNITED STATES IN 1903.—According to the report of Mr. E. W. Parker, of the United States Geological Survey, the total output of the coal mines of this country in 1903 amounted to 359,421,311 short tons. This is an increase of 57,830,872 tons, or 19 per cent., over the production of 1902. The value of the coal at the mines in 1903 amounted to $506,190,733—an increase of nearly 38 per cent. as compared with the total value of coal mined in 1902. Of the total production in 1903, 74,313,919 short tons represent Pennsylvania anthracite, valued at $152,036,448. The production of bituminous coal (which includes lignite, or brown coal, semi-anthracite, semi-bituminous and cannel coal, and scattering lots of anthracite) amounted to 285,107,392 short tons, valued at $354,154,285.

LIST OF ALTITUDES IN MEXICO AND CENTRAL AND SOUTH AMERICA.—Mr. Henry Gannett has compiled a list of altitudes in these countries, which is appended to the *Bulletin* of the Bureau of

American Republics for September. Brazil, Paraguay, and the Guianas are not included, and the compilation makes no pretence of being exhaustive in the other countries; but it embraces the principal mountains, table-lands, lakes, etc., of the Cordilleras, and hundreds of other altitudes throughout the Republics. The chief and the best sources of information are the extensive surveys of the Intercontinental Railway Commission, whose work included numerous determinations of altitude in the mountain regions between Mexico and Argentina, and the Argentine-Chile boundary map, based on the surveys of Argentine engineers. Other sources are of varying value, but the greater part of the altitudes given were obtained by the survey parties above mentioned.

The height assigned to Aconcagua, supposed to be the culminating point of South America, is that given by the Intercontinental Railway Commission, 23,080 feet; the height given by Güssfeldt, and long accepted, being 22,860 feet. Aconcagua should have been placed in the Argentine instead of the Chilian list of altitudes. A later measurement of Aconcagua by M. Schrader, president of the French Alpine Club, and the engineer Enrique del Castillo, is reported in the *Geographischer Anzeiger*, *Heft X:* 6,956 meters= 22,822 feet. The height of Orizaba is given, on the authority of the "Mapa de los Estados Unidos de Méjico," as 17,373 feet. Orizaba was supposed for some time in the last decade to be the highest point of North America, but, according to this list, Popocatepetl overtops it with 17,748 feet—a result obtained by taking the mean of several determinations.

AFRICA.

British Settlement in East Africa.—At a meeting of the Royal Colonial Institute in London in March last, Mr. Herbert Samuel, M.P., who had recently visited British East Africa, said that few persons realized what a valuable possession it was becoming. British settlers are now going out in considerable numbers to take up land in the Kikuyu region to the south of Mount Kenia, where whites may live in comfort and good health in a large district situated so high above the sea that temperate influences predominate. The Mombasa *Standard*, just received, announced the arrival of fifteen farmers in one week, who left at once for the interior to take up land near Nairobi, the most important place in that region. He thought it desirable to encourage the emigration of small working farmers to that part of Africa.

THE VARIATIONS OF LEVEL OF LAKE VICTORIA.—Captain H. G. Lyons, Director-General of the Survey Department of Egypt, has made a study of the variations of level of Lake Victoria, which forms Appendix III of *A Report upon the Basin of the Upper Nile, with Proposals for the Improvement of the River*, by Sir William Garstin, Under-Secretary of State for Public Works in Egypt (Cairo, 1904. fol. Pp. 20). The object of this study was to collect existing data as to the changes of level of the lake, and to endeavour to trace from these data the oscillations of the lake during the last twenty or thirty years. Two rainy and two dry seasons make up the year in the Victoria Lake basin, the rains coinciding more or less with the equinoxes, and the dry seasons with the solstices, except that the second, or minor, rains are delayed one or two months after the autumn equinox. The rainfall records are very incomplete and unsatisfactory, but the average lake rainfall may be taken as probably less than 1,500 mm. (60 in.). The winds on the lake itself are almost exclusively on and off shore breezes, due to the presence of the water, and correspond to the land and sea breezes in the case of the ocean; but the trade-winds, with their seasonal changes, are noted away from the lake.

The variations in the level of Lake Victoria are of several kinds. First may be noted the increase or decrease in size, due to climatic or other changes extending over long periods. There is much evidence around the lake that in early times its waters stood at a higher level. Certain flat alluvial plains in the valleys above the present lake-level are believed by Scott Elliot to have been deposited in the waters of the lake, and this authority puts the upper limit of these plains at thirty meters above the present lake-level. Secondly, there are oscillations due to variations in meteorological conditions having a comparatively short period, in which a time of high levels is followed by one of lower levels, and there are the annual oscillations, due to the April and the November rains. Concerning the former oscillations, there seems to be a general agreement on the part of Europeans and natives that the lake-level has sunk recently, and particularly from 1878 to 1892, after which there was a tendency to rise. This rise appears to have been limited to the period 1892–1895, or perhaps even to the years 1892 and 1895 only, which were years of heavy rainfall. From this time the fall has been almost continuous up to the end of 1902. Generally speaking, 1850–1878 was a wet period, and 1879 to 1886 a dry one, for the whole of Central Africa. The series of gauge-readings is too short to determine the period of secular oscillation; but they show a fall of 76 cms. (30 in.) in the average level of the lake between 1896 and 1902, since followed by a rise of 56 cms. (22 in.).

The tides of the lake have not yet been investigated with sufficient accuracy to determine their range; but *seiches* certainly occur, although no precise study of them has yet been made. It is probable that the sudden variations occasionally shown by some of the lake gauges are of the nature of *seiches;* but as there is only one station with a barometer, the subject cannot be pursued very far at present. All accounts of the lake mention the violent thunderstorms and the waterspouts and cloudbursts which occur there; hence it is not surprising that the gauges occasionally show irregularities. R. DeC. W.

PROGRESS IN KATANGA.—Mr. E. Tonneau, the Administrator of Katanga, in the southeastern part of the Congo Independent State, has a long article on that territory in the Aug.-Sept. number of the *Bulletin de la Société d'Études Coloniales.* In few parts of Africa is pioneer work more energetically pushed.

Katanga embraces practically all that part of the Congo State lying south of 5° S. Lat. and east of 27° 54′ E. Long. In other words, it includes most of the Upper Congo basin. It extends into the Equatorial Forest in the north, but large forests give place to savannas farther south. The mean temperature decreases towards the south, and the European suffers more from cold than from heat in southern Katanga. A mountain chain, parts of it known under different native names, crosses the entire country from the headwaters of the Lualaba in the south to northern Tanganyika in the northeast.

The density of population bears a close relation to soil fertility. Population is dense in the north and along the Lualaba for a considerable distance to the south of Lake Kisale; but in the mining regions of the south and southeast, where the soil is poor, the villages are small. The natives belong chiefly to the Batetela tribes in the northwest, the Manuema in the northeast, the Marunga along the coast of Tanganyika south of the Lukuga River, and the Baluba in most of the remaining territory.

The Special Committee of Katanga, represented in Africa by Mr. Tonneau, was organized four years ago, and began its work in May, 1901. Since then it has established many stations, and secured safety of communication, and its authority is widely respected. Great importance is attached to the development of better means of transportation, and to this end road-building has been pushed with much energy along the principal land routes, thus supplanting the tortuous native paths with good roads six feet in width. Such a road is now building between Pania Mutombo, the head of navigation on the Sankuru River, and Pweto, at the north end of Lake Moero. It is not continuous, for it is built to connect navigable stretches of water along the route. The construction of about 100 miles of road, including bridges, is completed, and several hundred miles of good wagon-roads have been built or are in progress in other parts of the country. It is expected in this way to replace freight carriage on the backs of men by traction.

At present, freight from Europe is brought by ocean steamer to Matadi on the Lower Congo, transshipped to the Congo railroad and carried to Stanley Pool, and then placed on a steamer which reaches Lusambo, at the northwest corner of Katanga, *via* the Congo, Kasai, and Sankuru Rivers; thence black porters, in the service of the Committee, take it east to Tshofa, on the Lomami River, whence it is distributed by bands of porters in all directions. Goods are delivered from Stanley Pool *via* Lusambo to Pweto, on Lake Moero, in 43 days, the distance in a straight line being over 1,000 miles, and much greater by the river and carrier routes.

Considering the length of rivers in Katanga, the navigable waterways are not extensive. They include, however, about 400 miles of navigation on the Lualaba, 30 on the Lufira, 86 on the Luvua. Studies are already beginning for the Katanga railroad, and it is expected before many years to bring mining machinery and other freight by steam from Europe to the southern frontier of Katanga.

The rubber harvest is not so large as was expected, because the plants were killed, to a great extent, by collectors before measures were taken to protect this Congo industry. Plantations for the cultivation of rubber are now opening. The quality of Katanga rubber is excellent, but the districts producing it will probably be confined to the Lomami and sections along the coast of Tanganyika and Moero.

Ivory is scarcely found in the country. The cultivation of European vegetables and other food plants at the stations is giving satisfactory results. Beef cattle, cows, sheep, and goats are kept at every station, excepting at certain points in the south, where the tsetse fly prevents the rearing of cattle. Abundance of fresh meat and milk are thus provided, and especial attention is given to breaking oxen to the yoke, with a view to using them largely for road traction.

Katanga is especially rich in mineral resources. Mr. Tonneau's paper does not deal with the gratifying results of the search for metals, undertaken in the basin of the Upper Luapula by Director Williams in behalf of the Tanganyika Concessions; but Mr. M. H. Buttgenbach, who has reported on the mineral resources outside the regions to be exploited by the Tanganyika Concessions, estimates the copper-producing area as about 5,800 square miles, and says that the output of sixteen of these mines justifies the claim that the district Sud du Katanga will be one of the richest copper-producing districts in the world. The average richness of the ore is 14 per cent. copper, and Mr. Buttgenbach estimates that nine mines, which he names, will yield 1,200,000 tons of copper.

Gold exists in placers and in minerals of copper, but in the latter case the quantity is very small. The metal has also been discovered at Ruwe in a bed of auriferous quartz, bearing also platinum and silver.

Many deposits of tin have recently been discovered in the north of the mining region. Inexhaustible quantities of salt may be obtained from the noted salines of Mwashia, on the right bank of the Lufira, in 10° 41′ S. Lat., the deposits being the result of the evaporation of thermal waters issuing from numerous fissures.

The buildings occupied by the whites are usually built of brick, each white agent having a house to himself, with two well-aired rooms and a veranda. Every station has a garden, poultry, cattle, and potable water. The food is excellent, and there is scarcely any station, no matter how isolated, that lacks comfort. The Committee believes that it has completed the work of organizing the administrative machinery, and may now devote most of its time to the development of Katanga's resources.

SLEEPING SICKNESS IN KATANGA.—The *Bulletin* of the Société d'Études Coloniales (Aug.-Sept., 1904) says that sleeping sickness is afflicting the tribes of northern Katanga (the region of the Lomami), and small-pox is found to some extent in all parts of the country. In view of the fact that the physicians of Uganda have attributed sleeping sickness to a parasite introduced into the blood by a species of tsetse fly, it is very interesting to hear from Katanga that the physicians there report many cases of the disease in the Lomami region, and add that the tsetse does not exist in that part of the country. They mention, as additional proof that the fly does not live there, that while its bite is fatal to cattle, these animals are thriving admirably at all the Lomami stations. On the other hand, southern Katanga is infested with tsetse fly; cattle cannot live there, but not a case of sleeping sickness has yet been reported.

THE INTERIOR OF ANGOLA.—Captain Boyd A. Cunningham describes in the *Geographical Journal* (August, 1894) a journey he has made into the far interior of Southern Angola, the Portuguese colony in West Africa. The region he describes is chiefly east of 15° E. Long., extending nearly to the frontier of the Congo State, and is the *hinterland* of the coastal region between Benguella and Mossamedes. Speaking of the rapid rise of the land from the coast to the interior plateau, he gives this table of altitudes along his route:

DISTANCE INLAND FROM BENGUELLA. (MILES.)	ALTITUDE ABOVE THE SEA. (FEET.)
57	1,350
117	2,500
120	3,000
160	4,800
180	5,400
200	5,900

The physical features of Angola may be said to consist of four distinctive belts, extending northeast and southwest: The *Coast Belt*, a sparsely-watered, sterile region extending inland from the coast 50 miles in the south and 150 miles in the north, its waters highly charged with sulphur and other minerals; climate hot and unhealthful, but might be ameliorated by sanitation; the *Mountain Belt*, extending 100 miles further inland, rugged and wild with luxurious vegetation, forests of tall hardwoods, fertile wooded valleys, and fairly abundant water; the *Highland Belt*, extending from the Congo to Humpata, 15° S. Lat., an undulating prairie plateau, 4,000 to 6,000 feet high, with wide, well-watered, treeless plains, a vast population of blacks, and the source of all the agricultural produce of the colony; and the *Inland Depression*, east of the Kwanza River, formed by the basins of the Kassai and Upper Zambezi. The expedition did not visit the last region.

The Boers who trekked into the country in 1880 and settled at Huilla and Humpata are now quite influential, and have in their hands practically the whole transportation of the land. The party visited the large and elevated Bihé district, which now, as ever, is the entrepôt of trade. In the days of the slave trade it was the collecting region for the multitude of slaves that were shipped from Benguella. The sons of those undisciplined slave raiders have become carriers in the service of white traders. Most of the exports from Benguella are obtained by the natives of Bihé, who act as intermediaries between the natives of the rubber-producing districts of the Congo basin and the European trading-houses in southern Angola.

THE OVERFLOW OF THE NILE.—"The Annual Rise and Fall of the Nile" is the subject of a paper by Percival C. Waite in the *Scottish Geographical Magazine* for September. In this article a summary is given of the most important facts in relation to the floods of this most interesting river. The floods themselves will always be uncontrollable by human agency, but the surplus water, when the floods are subsiding, can be dealt with. The value of the Nile to Egypt, where practically no rain falls, has been recognized from the earliest times, and the Nile flood depends upon the fact that some of its headwaters come from a region of summer rainfall dependent upon the migration of the belt of equatorial rains north of the Equator. The Nile basin has, in reality, five great areas, viz.: 1. The Equatorial, with constant rainfall; 2. The Riverine, with heavy rain only in the summer; 3. The Abyssinian, with heavy rain only in the summer; 4. The Desert, without any rain; and 5. The Delta, with slight rain in the winter. The first area gives a constant flow of water, and the great lakes in it regulate the supply. The excess in the second and third areas gives the floods, mitigated, in the case of the White Nile, by temporary lakes caused by the overflowing of the low-lying country by the surplus water, and a large loss by evaporation. The Blue Nile and the Atbara are the principal cause of the annual inundation, and upon these depends the fertility of Egypt, for they bring down the rich sediment which forms the Delta and covers the land on each side of the river in Lower Egypt. Together with the Sobat, these rivers drain the greater part of the Abyssinian Mountains; they are torrential, and liable to rise suddenly. The White Nile has a more regular and steady supply of water, owing to the great lakes, which act as reservoirs, and this river prevents the lower part of the Nile from drying up altogether in summer. An early maximum on the Nile is derived principally from a "good" Blue Nile; while a late maximum is caused by a "good" White Nile. The Blue Nile is in flood from about June 5, and reaches its maximum about August 25, twenty-five days before the White Nile. The united maximum occurs about September 5. The author of this paper finds a general agreement between the maximum rise of the Nile at Rhoda and sunspot periods. The years 1901 and 1902 were both years of low Nile, "but now we are approaching a sunspot maximum, and may look for better floods, on an average." R. DeC. W.

THE RUWENZORI REGION.—Dr. J. David, of Basel, was a member of a Belgian expedition that since the spring of 1903 has been making the preliminary studies for a railroad route through the great forest region between the Aruwimi River and Lake Albert Nyanza. The results of his observation of the pygmies on the Upper Ituri were published in *Globus* (Vol. 85, No. 8), and the same journal (Vol. 86, No. 4) tells of his killing an okapi and of his ascent to a high altitude of the Ruwenzori range. He is said to be the first European to secure a specimen of the okapi with his own gun, the skins and skeletons hitherto shown having been provided by the natives. Dr. David may be, therefore, in an excellent position to describe the physical character of the animal. This ruminant, he says, has not the bearing of an antelope, as many imagine, but much more nearly resembles a tapir. Its stripes are more beautiful than those of the zebra, and are usually double, white within black. The back is reddish, particularly in the males; the ears are very large and adorned with tufts of hair, and the mane is erect. Some of them of both sexes have horns, while others have none, whence Dr. David infers that there are at least two species. The height of the okapi at the withers is 3.9 to 5 feet.

Another interesting zoological find was an armadillo slightly over four feet in length, living on mice and worms, and closely resembling its congener of the pampas. It usually sits erect, partly supported by its tail, and embraces the tree trunks between its powerful fore claws.

Dr. David is an experienced mountaineer, and this contributed to his success in climbing the western slope of the Ruwenzori range.* Dr. David estimates the height he reached at 16,700 feet, which, if correct, is the highest yet made in this region. He says that the range is composed of a series of granite, diorite, and diabase ridges; he saw no porphyry or basalt. The snow-line is at an elevation of about 14,500 feet; but the glaciers go lower, to about

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* According to the Rev. A. B. Fisher (*Geog. Jour.*, Sept., 1904) the few persons who tried to climb the range attacked it from the east side, and he believes they might have succeeded better on the west side. But, in fact, Stairs, Elliott and Stuhlmann climbed from the west.

13,000. Near the two glacier tongues which he visited were two small moraine lakes, and a little below them was a third lake of milky-green colour, surrounded by thick vegetation; while a fourth, which was fed by glacier streams, was clear, though of a greenish-brown colour, perhaps derived from the neighbouring moorland.

On the west side of the range seven zones of vegetation are distinctly defined—the humid forests spreading over the swamp, grass and sedge lands of the Semliki River; the region of ferns and orchids, with tobacco culture between 5,200 and 7,200 feet; the bamboo zone, with the highest permanent settlements of the natives between 7,200 and 7,900; the high moor, with thick mosses saturated with water, lying between 8,000 and 11,800 feet; the fifth, sixth, and seventh zones are all moorland of one sort or another. The *Senecio Johnstoni* was found up to 12,800 feet. There was a striking absence of flowers and of the lush dwarf vegetation characteristic of the Alps. Dr. David collected on Ruwenzori over 100 species of plants.

ASIA.

THE RAILROAD AROUND LAKE BAIKAL.—The Russians have practically completed the link in the Siberian Railroad around the south end of Lake Baikal. It follows the shore-line between the completed portions of the railroad from Baikal station, at the mouth of the Angara River on the west coast, to Myssowek on the east coast. The road is only about 160 miles in length, but it has presented the most serious engineering difficulties. The calculated expenditure was $26,261,840, making it the most expensive bit of railroad ever built in the Russian Empire. It will obviate the ferriage of trains across the lake, which is very troublesome in winter. Ice-breakers have been used, or freight has been hauled on sledges; and on the outbreak of hostilities a track was laid across the ice.

The greatest difficulties in building were met between Baikal station and Kultuk, at the southwest corner of the lake. The distance is only 52 miles, but the coast is very mountainous, and with only a narrow foreshore, while in many places the mountains descend sheer to the lake. The line winds along the side of or makes its way through the mountains. In this short section there are 32 tunnels, besides 210 bridges, viaducts, and special supports. The looseness of the rock necessitated the bricking up of the tunnels to a far greater extent than had been expected.

Along the other section, from Kultuk to Myssowek, the mountains recede further from the shore, leaving flat land for the railroad, which passes through only one tunnel; but several large streams must be crossed, so that a number of bridges up to 500 feet in length were required. The road has only one line of rails, but tunnels have been built to accommodate two lines. It is calculated that at present seven trains will be able to pass daily in each direction.

AUSTRALASIA.

A Bathymetrical Survey of the Lakes of New Zealand.—The *Geographical Journal* describes (May, June, 1904) the survey that was made in 1902 of the principal lakes of New Zealand, the primary purpose being to obtain some knowledge of the forms of the lake basins, upon which to base a biological study of the lakes. Compared with the detailed work done in the lakes of Europe the surveys were not minute, but they were sufficient for the drawing of rough contour lines in all parts of the lakes. Two of these lakes are among the deepest in the world. They are Wakatipu and Manapouri, among the New Zealand Alps, in the southern part of the South Island; all the other lakes surveyed being in the North Island.

Lake Wakatipu is 49 miles long, and the water surface has an area of 112.3 square miles, and is 1,016 feet above sea-level. The maximum depth is 1,242 feet, and the mean depth 707 feet. Few lakes reach so great a mean depth. Lake Manapouri, whose outline is very complicated, has an area of 56 square miles, inclusive of a number of small islands, its surface lying approximately 597 feet above sea-level. The greatest depth found was 1,458 feet, which occurs in a large depression, 2.7 square miles in area, all of which exceeds 1,400 feet in depth. This deepest depression is surrounded by the highest and steepest slopes that the shores afford. In contrast with these maximum depths of 1,242 and 1,458 feet in comparatively small lakes it may be mentioned that the maximum depths of our great lakes are: Superior, 1,008 feet; Michigan, 870; Ontario, 738; Huron, 730; and Erie, 210. These two lake basins in New Zealand seem to be an integral part of the surrounding country, their slopes continuing the slopes of the mountain sides. They are mountain valleys filled with water, and if drained dry would not appear in any way remarkable.

Taupo and Rotoiti appear to the historian of the survey, Mr. K. Lucas, to be of tectonic origin, the basin of Taupo, for example, being a trough abruptly sunk in the surface, the perpendicular cliffs of the west shore dropping suddenly down from among hills of comparatively gentle slope. Waikare Moana is a valley lake, and Waikare and Whangape are so shallow as to rank rather with swamps than with lakes. The following table condenses the more important facts to be found in the report on the survey:

	AREA. SQ. MILES.	HEIGHT ABOVE THE SEA. FEET.	GREATEST DEPTH. FEET.	MEAN DEPTH. FEET.	NUMBER OF SOUNDINGS PER SQ. MILE.
Taupo	238	1,211	534	367	2.6
Wakatipu	112.3	1,016	1,242	707	1.7
Manapouri	56.0	597	1,458	328	3.6
Rotorua	31.6	915	84	39	5.6
Waikare Moana	20.8	2,015	848	200	12.9
Rotoiti	14.2	910	230	69	12.6
Waikare	10.7	?	9	4.6	19.8
Whangape	4.0	?	9	4.5	95.0

THE NEW ZEALAND YEAR BOOK FOR 1903.—The twelfth issue of the *Year Book* has an article on the social organization and life of the Maori people prior to the advent of the Europeans. They still maintain the old practices, in some respects. Marriages are still often arranged by the uncles and aunts of a girl, the parents taking little or no part in the matter. The marriage of near relatives, such as first cousins, was and is abhorred, for cousins are termed brothers and sisters in accordance with the native conception of the social unit. The census of the Maori population, taken in 1901, showed 43,143 persons—a decrease of 2,327 since the first census in 1874. The Europeans are eighteen times as numerous. Among other articles of geographical interest is a description of the district of Rotorua, with its great variety of hot mineral springs and lakes, remarkably coloured by mineral matter in solution. The hot swimming baths, maintained both for those who come "for the cure" and for tourists, are among the finest in the world. The tourist and health resorts supported by the Government at Hanmer Hot Springs, Mount Cook, and the southern lakes are also described. New Zealand is exceptional in having a Government Tourist Department, and under its control is the hotel near the base of Mt. Cook (12,348 feet), in the heart of the Southern Alps. A journey of 96 miles by coach, from Fairlie on the railroad, lands the tourist at the hotel. Here guides and horses are obtained for visits to the glaciers, including the great Tasman Glacier. Many Alpine excursions are made from two huts erected at higher elevations among the mountains.

POLAR.

FAILURE TO REACH FRANZ JOSEF LAND THIS SEASON.—The failure of Mr. W. S. Champ's first attempt this year to find a way through the ice of Barents Sea on the steamer *Frithjof* and carry supplies to the Ziegler-Fiala Arctic Expedition, which is supposed to be in Franz Josef Land, was recorded in the August BULLETIN (p. 488). His party sailed again from Vardö, but his second attempt was equally unsuccessful. Mr. Champ, who has returned home, says the *Frithjof* will make another attempt to reach Franz Josef Land in June next year.

FORESTS AND CLIMATE.

The relation of forests to rainfall, evaporation, transportation and run-off is discussed by James W. Toumey in the Year-book of the Department of Agriculture for 1903 ("The Relation of Forests to Stream Flow"), special reference being made to a series of observations which have been going on for several years in the San Bernardino Mountains, in southern California. So close is the relation between precipitation and forest cover in that region that "it is possible to judge the mean annual precipitation with a fair degree of accuracy from the appearance of the forest alone." The writer, however, points out that the differences in rainfall are the cause rather than the effect, and that while it is reasonable to infer that forests may have some influence in increasing precipitation, because of their known effect on temperature and on relative humidity, no definite answer to this question can yet be given. That evaporation from water or other wet surfaces on the floor of forests is one-third or one-fourth of that from similar surfaces in the open has been shown both by European observations and by those in the San Bernardino Mountains. In the latter case the first foot of depth in the mineral soil in the forest may contain two or three times as much moisture as soil of the same general character from similar situations in the open. The evaporation of snow in our western mountains is due largely to dry winds, and in the San Bernardino Mountains a foot of snow is sometimes evaporated in two or three days without moistening the soil. As forests check wind movement and provide shade, they must lessen evaporation. The importance of forests in sustaining the flow of mountain streams and in regulating the run-off is emphasized.

R. DEC. W.